

Appl. No. 10/042,237  
Amtdt. dated Dec 15, 2004  
Reply to Notice of Nov. 24, 2004

USSN 10/042,237  
Art Unit 2644

**Amendments to the claims**

This list of claims will replace all prior versions, and listings of claims in the application:

1(currently amended). A method of detecting double-talk and path changes in an echo cancellation system including a Least Mean Squares adaptive filter for generating an echo cancellation signal and having an echo path between a received path and a send path, and wherein a send path signal at an input to said send path comprises an echo source signal after said echo source signal has travelled said echo path and in the event that double-talk is present a double-talk signal, said method comprising:

generating a cross correlation matrix

$$\mathbf{R} = E[\mathbf{x} \mathbf{x}^T]$$

where  $E$  is the statistical expectation operator and

$$\mathbf{x} = \begin{bmatrix} \mathbf{X}_0 \\ \mathbf{X}_1 \end{bmatrix} \text{ where}$$

$\mathbf{X}_0$  is an echo said send path signal and  $\mathbf{X}_1$  is an estimated echo signal generated by said adaptive filter; and

performing a matrix operation on said matrix  $\mathbf{R}$  to generate a characteristic value determinative of the correlation between said signals  $\mathbf{X}_0$  and  $\mathbf{X}_1$ ; and

detecting the presence of double-talk and path changes occurring in said system from said characteristic value; and

adjusting the operation of said adaptive filter in response to said detecting step.

2 (cancelled).

3(previously presented). A method as claimed in claim 1, wherein said characteristic value is the determinant of said matrix.

4.(previously presented) A method as claimed in claim 3, wherein said double-talk and path changes are inferred when said determinant passes predetermined threshold values.

5(withdrawn). A method as claimed in claim 1, wherein said characteristic value comprises eigendecompositions of said matrix.

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6(withdrawn). A method as claimed in claim 1, wherein said characteristic value comprises single valued decompositions of said matrix.

7(withdrawn). A method as claimed in claim 1, wherein said characteristic value comprises condition numbers of said matrix.

8(cancelled)

9(cancelled)

10(previously presented). A method as claimed in claim 1, wherein said Least Mean Square filter implements a normalized-LMS algorithm.

11(previously presented) A method as claimed in claim 1, wherein the elements of said matrix are generated in the time domain.

12(withdrawn) A method as claimed in claim 1, wherein the elements of said correlation-based matrix are generated in the frequency domain.

13(cancelled)

14(cancelled)

15(cancelled)

16(cancelled)

17(cancelled)

18(cancelled)

19(cancelled)

20(cancelled)

21(cancelled)

22(cancelled)